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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,179	07/02/2003	Roland Kreutzer	A2038-706120	5239
76634 7590 09/23/2008 LOWRIE, LANDO & ANASTASI, LLP A2038 ONE MAIN STREET, SUITE 1100 CAMBRIDGE, MA 02142				
EXAMINER VIVLEMORE, TRACY ANN				
ART UNIT		PAPER NUMBER		
1635				
NOTIFICATION DATE		DELIVERY MODE		
09/23/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/612,179

Applicant(s)

KREUTZER ET AL.

Examiner

Tracy Vivemore

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4, 6-9 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4, 6-9 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Any rejection or objection not reiterated in this Action is withdrawn.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 16, 2008 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4 and 6-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a new matter rejection.

The claims are directed to isolated oligoribonucleotide having a double stranded structure (dsRNA) consisting of two separate non-linked complementary RNA strands, wherein the dsRNA is 21 nucleotides in length. The specification discloses on page 4 that the dsRNA of the instant invention has 10 to 1,000, preferably 15 to 49, base pairs. The specification further discloses in example 2 a RNA of 21 nucleotides that is linked to its complement by an alkyl linker that forms a disulfide bond. The specification does not contemplate a limitation wherein the dsRNA is 21 nucleotides in length and consists of separate non-linked strands and hence does not provide support for such. Furthermore, the claims of the instant application, as originally filed, were drawn to a composition comprising an oligoribonucleotide having a double stranded structure (dsRNA) wherein the dsRNA is 10-1000 nucleotides in length. Therefore, the claim limitation of "non-linked strands" first introduced in the amendment to the claims filed April 22, 2005, constitutes new matter.

Applicants' remarks filed April 22, 2005 state that support for the amendments to the claims can be found throughout the specification, such as at page 4. A review of the specification, and particularly page 4, does not reveal support for where the various claim amendments are found. While the working examples do disclose use of a single 21 nucleotide RNA, the strands of this RNA are connected by a non-nucleotide linker; therefore RNA of the recited length appears only in the context of covalently linked strands. Applicants further state in the remarks of 4/22/05 that use of an internal example within a disclosed and claimed range to set a new bound for the claimed range

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is acceptable based on the decision *In re Wertheim*, (541 F.2d 257,262, 191 USPQ 90, 96 (CCPA 1976)).

However, *Wertheim* also discusses an important issue relevant to the instant claims; whether the narrower range constitutes a different invention. The court stated on page 98, "[w]here it is clear, for instance, that the broad described range pertains to a different invention than the narrower (and subsumed) claimed range, then the broader range does not describe the narrower range."

As is well known in the art and as first disclosed by Elbashir et al. (Nature 2001, of record), the discovery that 21 and 22 nucleotide duplexes are capable of specific gene inhibition without the corresponding widespread and nonspecific degradation of mRNA represents a quantum leap forward in understanding how the RNAi process operates:

"RNA interference (RNAi) is the process of sequence- specific, post-transcriptional gene silencing in animals and plants, initiated by double-stranded RNA (dsRNA) that is homologous in sequence to the silenced gene. The mediators of sequence- specific messenger RNA degradation are 21- and 22-nucleotide small interfering RNAs (siRNA's) generated by ribonuclease III cleavage from longer dsRNAs. Here we show that 21-nucleotide siRNA duplexes specifically suppress expression of endogenous and heterologous genes in different mammalian cell lines, including human embryonic kidney and stem cells. **Therefore, 21-nucleotide siRNA duplexes provide a new tool for studying gene function in mammalian cells and may eventually be used as gene- specific therapeutics.** (emphasis added).

Based upon this discovery, the disclosure that 21 nucleotide long dsRNAs show promise as therapeutics has stimulated an entire industry devoted to honing siRNA-mediated sequence specific gene inhibitory therapeutics. As applicants are no doubt aware, dsRNA of greater than 30 nucleotides operate differently from those having a length of 21 nucleotides. From the bottom of page 494 bridging to page 495 of Elbashir:

"But it is known that dsRNA in the cytoplasm of mammalian cells can trigger profound physiological reactions that lead to the induction of interferon synthesis. In the interferon response, **dsRNA > 30 bp binds and activates the protein kinase PKR and 2', 5'- oligoadenylate synthetase (2', 5' -AS).** Activated PKR stalls

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translation by phosphorylated and of the translation initiation factors eIF-2a and activated 2', 5'-AS causes a marked mRNA degradation by 2', 5'-oligoadenylate-activated ribonuclease L. These responses are intrinsically sequence nonspecific to the inducing dsRNA."

Because it was well-known in the art that the use of dsRNAs longer than 30 nucleotides institutes widespread and nonspecific degradation of mRNA and are thus not desirable candidates for such therapeutics, the amendment to narrow the claimed range of dsRNA from 15 to 49 nucleotides to the presently recited 21 seeks to exclude only those RNAs responsible for the widespread and nonspecific degradation of mRNA and is considered to pertain to a different invention than originally claimed range.

Response to Arguments

Applicants traverse the new matter rejection by arguing that while the embodiment relied upon to support the limitation of 21 nucleotides comprises a linker, other portions of the specification disclose that a linkage is not required. Applicants conclude that the embodiment of dsRNA of 21 nucleotide without a linkage satisfies the written description requirement without relying on *In re Wertheim*.

This argument is not persuasive because *Wertheim* has been relied upon to provide support for the limitation that the dsRNA is 21 nucleotides. This embodiment is specifically acknowledged by applicants as requiring a chemical linkage, as evidenced by page 19 of the instant specification. This page states, when describing use of a 21 nucleotide dsRNA, "This result demonstrates that even shorter dsRNAs can be used for specifically inhibiting gene expression in mammals when the double strands are stabilized by chemically linking the single strands." Based on this, applicants clearly

consider the chemical linkage an essential element for successfully inhibiting gene expression with a 21 nucleotide dsRNA, therefore this limitation is considered in the context of applicants' reliance on *Wertheim*.

Applicants argue the presently pending claim length of 21 nucleotides solves the same problem as the original range 15-49 nucleotides and that the currently claimed dsRNAs do not represent a different invention. Applicants base the assertion that the problems solved are the same on the disclosure of the specification at pages 4-5 and note that the specification recognized the undesirable properties of longer RNAs and teaches that shorter RNAs solve this problem.

This is not persuasive because the 21 nucleotide dsRNA of the present claims is considered to be an invention distinct from the previously claimed dsRNAs for the reasons set forth in the rejection.

Claim Rejections - 35 USC § 102

The instant invention is drawn to an isolated oligoribonucleotide consisting of two separate non-linked RNA strands of 21 nucleotides wherein the first strand is complementary to a mammalian target and the second strand is complementary to the first strand. In specific embodiments, the target gene is a mammalian gene, one strand of the dsRNA is fully complementary to the target gene, the two RNA strands are fully complementary to each other and the target is a primary or processed RNA transcript.

Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows: The later-filed application must

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be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The instant application does not receive the benefit of 09/889,802 or earlier applications because claims 4 and 6-9 of the instant application are not supported by the specification and claims of these applications, as demonstrated in the new matter rejection above. The parent applications do not disclose a limitation wherein the dsRNA contains separate non-linked strands and is 21 nucleotides in length. Thus, the effective filing date is determined to be that of the instant application, July 2, 2003.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 4 and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Elbashir et al. (Nature 2001, of record).

Elbashir et al. disclose 21-nucleotide siRNA duplexes that are transfected into mammalian cells to specifically suppress expression of endogenous and heterologous genes in different mammalian cell lines (see page 494). Elbashir et al. also disclose duplexes comprising deoxythymidine, which is a modified ribonucleotide to enhance nuclease resistance (see pages 495 and 496).

Thus, Elbashir et al. disclose all limitations of and anticipate claims 4 and 6-9.

Claims 4 and 6-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Tuschl et al. (WO 02/44321, of record).

Tuschl et al. disclose dsRNA consisting of two separate RNA strands of 19-25 nucleotides, preferably 21 nucleotides, which are capable of mediating RNAi, including in mammalian cells (see pages 3-4 and page 8, lines 4-25). One strand of the duplex is preferably 100% complementary to the target and siRNAs containing at least one modified nucleotide analog, for example a 2'-O-methyl sugar modification of a phosphorothioate are especially preferred (see pages 6 and 46). Tuschl et al. also disclose (see page 44) that the dsRNA of their invention can be 21 nucleotide siRNA duplexes with blunt ends, which are two strands fully complementary to each other.

Therefore, Tuschl et al. disclose all limitations of and anticipate claims 26-33 and 35.

Response to Arguments

Applicants traverse the art rejections of record by noting these references are not available as prior art. These arguments are not persuasive because the priority date for claims 4 and 6-9 remains July 2, 2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal et al. (WO 94/01550, of record).

The claims are directed to a dsRNA 21 nucleotides in length wherein a linker connects the two complementary strands. The linker may be a covalent bond and one strand of the RNA may be fully complementary to a mammalian target gene.

Agrawal et al. teach self-stabilized oligonucleotides useful for antisense therapeutics that comprise a target hybridizing region and a self-complementary region. On page 9, line 30 through page 10 line 1 Agrawal et al. disclose that the target hybridizing region is complementary to a nucleic acid sequence from a variety of sources and is from 8-50 nucleotides in length. On page 15, line 26 through page 17, line 12 Agrawal et al. disclose that the self-complementary region of the oligonucleotide is fully or partially complementary to the hybridizing region, the hybridizing region and

the self-complementary region can be linked by a polyethylene glycol linker, which is a chemical linker that forms a covalent bond. Agrawal et al. do not explicitly disclose an embodiment wherein the RNA is 21 nucleotides in length but it would be obvious to one of ordinary skill in the art to make such an oligonucleotide. One of ordinary skill in the art would recognize that producing an oligonucleotide of 21 nucleotides is a matter of design choice based on the disclosure in Agrawal et al. that the self-stabilized oligonucleotides can be up to 50 nucleotides in length and the target hybridizing and self-complementary regions can be of identical length. One could predictably make oligonucleotides of the recited length because chemical synthesis of oligonucleotides is routine in the art.

Thus, claims 16-18 would have been obvious, as a whole, at the time the invention was made.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Vivemore whose telephone number is 571-272-2914. The examiner can normally be reached on Mon-Fri 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James (Doug) Schultz, can be reached on 571-272-0763. The central FAX Number is 571-273-8300.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now

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